ESA-140 Public Report

Introduction:

The ATK Lake City Army Ammunition Plant was built in the early 1940s to produce small caliber ammunition. The 4,000 acre facility uses natural gas for process heating and space heating (seasonal). There is no electrical power generated on site.

Process heating uses include gas-fired furnaces and endothermic gas generators for pre-heating, annealing, and carburizing shell casings and clips. Direct-fired furnaces and heaters account for approximately 32% of the facility's annual natural gas consumption.

The steam systems account for approximately 68% of the facility's natural gas consumption. Of that amount, the north and south systems consume approximately 74% and 26%, respectively.

This energy savings assessment focused on the plant's north system. Some of the opportunities discussed herein might also be present in the facility's south system.

A two header SSAT template was used to construct an approximate model of the north system. The ATK team will refine this model as accurate fuel and steam usage figures become available. The ATK team can also create a model of the south steam system.

Objective of ESA:

The objective of the ATK Energy Savings Assessment (ESA) was to

- Perform an abbreviated Energy Savings Assessment using the Department of Energy's suite of Steam Tools, and
- Train the staff in the use of the Steam Tools so that they can identify additional energy savings opportunities after the Energy Savings Assessment.

Focus of Assessment:

North system boilers, steam distribution systems, end uses of steam, condensate return systems

Approach for ESA:

Provided training on DOE Steam Tools suite and utilized same to identify and analyze potential energy savings opportunities.

- Identified opportunities and best practices using the Steam System Scoping Tool
- Modeled parts of the steam system using the Steam System Assessment Tool
- Used SSAT to estimate savings from opportunities identified in SSST
- Trained ATK staff in the use of 3E PLUS to evaluate insulation-related opportunities

General Observations of Potential Opportunities:

The potential energy savings opportunities summarized on page one includes estimated time horizons for implementation. The opportunities are categorized as near-term, medium-term, or long-term according to the general guidelines below.

- **Near-term opportunities** include actions that can easily be attained in less than one year. Examples include improvements in operating activities, equipment maintenance, and relatively low cost actions or purchases.
- **Medium-term opportunities** would typically require one to two years to implement and would require additional engineering and economic analysis. Examples include capital equipment purchases and moderate changes to the plant's steam system or processes.
- **Long-term opportunities** typically require two to five years to implement. Examples include new technologies or significant changes to either the steam system or the plant's processes.

The potential savings opportunities can be categorized as follows:

Time Horizon	% of Savings Opportunities
Near-term	100%
Medium-term	0%
Long-term	0%

Energy Savings Opportunities:

1. *Implement steam trap maintenance program* – The facility contains approximately 4,000 steam traps, 2,945 in the field and approximately 1,100 in the production buildings. The last comprehensive steam trap inspection and maintenance program was three to five years ago. In this assessment, the team assumed that there were approximately 2,000 traps in the north system. SSAT provides order-of-magnitude estimates of steam flow through failed traps; ATK can use this information, together with SSAT's marginal cost of steam, to estimate the cost of steam traps failed in the open position.

2. *Increase LP condensate recovery* – The facility recovers approximately 25% of its steam as condensate. There is an opportunity to increase this figure to 40% by replacing a freeze-damaged condensate return pipe from building 2 to the powerhouse (building 15).

3. *Implement steam leak maintenance program* – There is an opportunity to repair a moderate number of steam leaks observed in the field. SSAT provides order-of-magnitude estimates of steam flow through leaks; ATK can use this information, together with SSAT's marginal cost of steam, to estimate the cost of steam leaks.

4. *Increase boiler efficiency (lower excess O_2)* – There is an opportunity to save natural gas by lowering boiler excess O2, thus increasing boiler efficiency.

5. *Increase temperature of boiler make-up water* – There is an opportunity to decrease the consumption of steam in the deaerator, and thus reduce natural gas consumption, by utilizing waste heat to increase the temperature of the boiler make-up feedwater. Similarly, the plant could utilize waste heat to increase the temperature of the condensate being returned to the boilers.

Other potential opportunities:

A process heating assessment was beyond the scope of this steam system assessment; however, two potential opportunities were observed. There may be an opportunity to retrofit the facility's nine Salem furnaces (ca. 1941) with modern, efficient gas burners. There might also be an opportunity to utilize waste heat from the furnace hoods and stacks to pre-heat the combustion air to the furnaces.

The steam system savings opportunity calculations are contained in Excel spreadsheet files:

File	Contents
ESA-140 Army Ammo Energy Summary	Consumption data, savings summary, sample calculations
ESA-140 Steam System Scoping Tool	ATK SSST
ESA-140 SSAT 2 Header ATK	Approximate model of ATK's north steam system

Management Support and Comments:

The ATK team was very interested in and supportive of this energy savings assessment. They will use the DOE Steam Tools to identify and quantify additional opportunities to reduce their gas and electric consumption.

DOE Contact at Plant/Company:

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